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THE SELECTION OF PATIENTS AND OF OPERATION IN THE SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS.*

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Fortunately, the surgical treatment of tuberculosis of the lungs is gaining headway in the United States. This advance in therapy has been very slow in arriving, principally because most phthisiologists have feared any surgical procedure and because they have had too little opportunity to observe the remarkably good results that can be shown in properly selected cases. I feel convinced that surgery in the treatment of this disease will advance in geometrical progression as more and more favorable reports come in, so that the usual swing of the pendulum may even lead to ill-advised operation. But at last there will be a proper balance and this most valuable adjunct to the medical treatment of phthisis will rest upon a firm foundation. Meanwhile, all who are doing this work should keep careful records of their cases and should conscientiously report them so that reliable data may be acquired.

In order to help the development of some form of standardization in selecting cases for the different types of surgical procedures, I venture to make the following suggestive notes:

The production of artificial pneumothorax is an extremely valuable procedure and may even lead to an arrest of the tuberculous process almost amounting to a cure. Although, strictly speaking, the method is a surgical one, yet it is the phthisiologists almost exclusively who practice it as what is generally termed a medical procedure. They have learned how to select the cases that are most likely to be benefited and they have become extremely skilful both in performing this delicate operation and in securing good results in the presence of difficulties that formerly would have been considered insurmountable. Adhesions, for example, which looked as if they would surely prevent collapse of the lung, have been gradually stretched until almost full compression has been secured. One of the most annoying complications that arises during the maintenance of the pneumothorax is the accumulation of fluid in the pleura. Whether because of pleural tuberculosis or on account of pyogenic infection this fluid may become purulent. In the pyogenic infections a true mixed empyema results with all the dangers which that condition entails. The pyogenic organisms can sometimes be eliminated by means of antiseptic washing through an aspiration needle but when this proves unsuccessful and the patient grows weaker and more toxic, operative surgery must be invoked. When tuberculosis of the pleura is present, little cold abscesses of the chest wall frequently develop in the puncture tract. These may be numerous and close together so that they coalesce and collections of pus of considerable size may form in the thoracic wall, demanding operative drainage. They are not easy to cure. The infection may in great part be avoided by injecting a few dops of 2% lysol solution or of 95% alcohol through the needle while it is in situ and just before withdrawing it. Some of the alcohol or lysol may even be thrown into the tissues as the needle is withdrawn.

Obstinate mixed infection of the pleural sac with fever and other septic phenomena demands drainage by thoracotomy. The operation is done in local anesthesia and consists merely in the resection of a short piece of the eighth or ninth rib in the posterior axillary line with incision of the pleura. There is seldom need for more than the removal of an inch and a half of the bone, but the periosteum must be taken with it to prevent a too rapid regeneration with deformity of the rib and frequently with osteomyelitis.

The case should then be treated by the Carrel-Dakin method until the growth of all pus-forming bacteria has been checked. The tuberculous pleuritis is more difficult to manage, however, and may demand surgical procedures of considerable severity which need not be described here. The question of the fate of the collapsed lung will, however, arise. The physician in the case must decide whether or not a re-expansion is desirable, for this depends upon the degree of destruction which the organ has undergone and the character of the lesion. A lung honeycombed with tuberculous cavities, for example, should surely not be permitted to function again;

*Read before the New York Academy of Medicine at its meeting on December 20, 1923.

while if the infection of the pneumothorax occurred at about the time the experiment of re-expansion was to be made, there is no reason why it should not be carried out now. In the case of the incurably damaged lung which must on no account be permitted to expand, a thoracoplastic obliteration of the pleural cavity in full or in part must be brought about. This is aided by the deviation of the mediastinum toward the affected side with physiological emphysema of the sound lung and the rising of the diaphragm, perhaps increased by resection of the cervical portion of the phrenic nerve. At any rate, the emergency of the tuberculous mixed infection

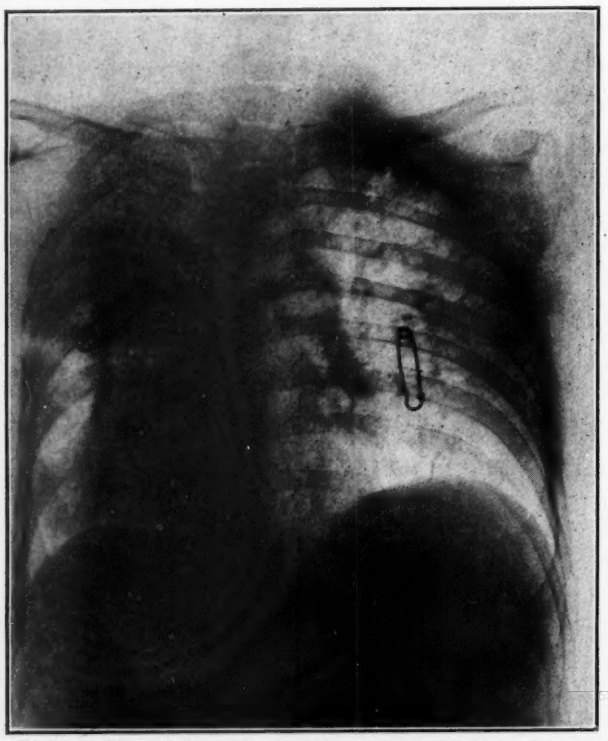

Fig. 1. Case of Miss F. B. following extrapleural left thoracoplasty. The collapse is not as perfect as possible owing to dense infiltration of the lung. Note normal elevation of left diaphragm.

has been eliminated by the drainage and the patient may become virtually well, except for the small thoracic fistula. In a year or more the decision can be made either to do nothing further or to make other operative attempts to close the sinus and the cavity. If this is successfully accomplished we have placed this lung permanently out of commission and have given the tuberculous process every opportunity to become arrested. Fibrosis and calcification may later produce a clinical cure. But until the tuberculous element is pronounced negligible, the surgeon must remember that his patient still has tuberculosis and he will do well to transfer the case back to the care of the family physician and the phthisiologist. The fact that the wound is healed is not an assurance that the patient is well.

Let us now consider the cases in which for some reason artificial pneumothorax is not applicable or those in which this therapy has failed, but not on account of pleural infection. These cases fall roughly into two main classes, both, however, being of the chronic variety. We shall also assume that all the patients coming to the surgeon have had the full advantage of scientific treatment, preferably in sanatoriums.

The first of our two classes, then, is that in which the lung is adherent to the chest wall over so large a surface that the induction of pneumothorax is either physically impossible or that too little air can

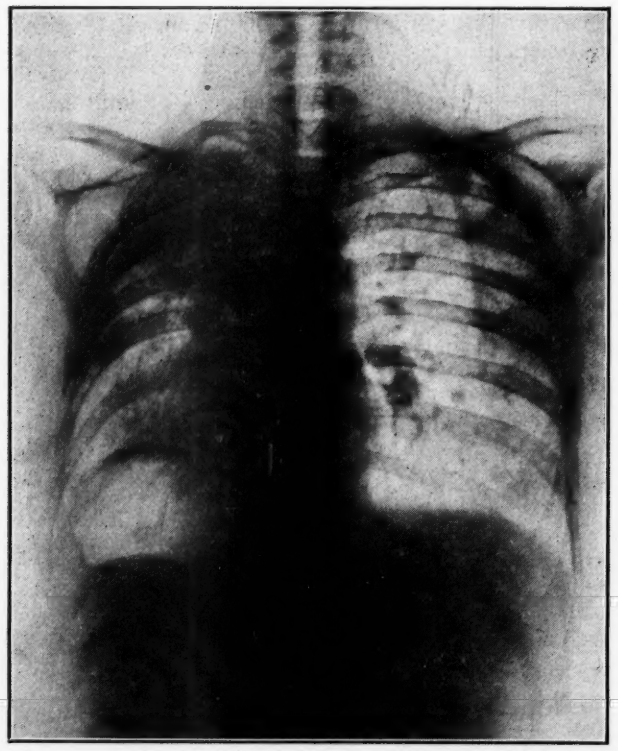

Fig. 2. A later picture of the same patient shown in Fig. 1 but following a phrenic nerve resection. The left diaphragm is now much higher than the right. Note gastric bubble (magenblase) beneath it.

be put in to accomplish any lasting benefit. It then becomes a matter of judgment on the part of the physician whether medical and hygienic treatment can bring about an afebrile fibrosis with arrest of the disease. It may take a year or more to decide this point and several years to accomplish a cure. Other cases of the same class may be considered for some other reason unsuitable for the pneumothorax treatment and yet refuse to respond to more usual measures.

The second class consists of unilateral cases in which there is such a degree of cavitation that manifestly the lung should never again be permitted to expand. The choice then lies between permanent pneumothorax with its dangers and annoyances, and a collapsing surgical operation upon the chest wall

which will splint the lung forever and reduce respiratory motion to a far greater degree than could any pneumothorax. For, after all, there is a slow periodic alteration between greater and less pul-

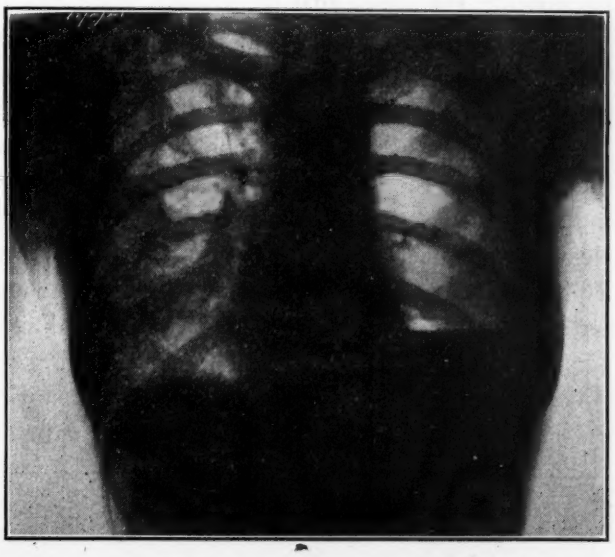

Fig. 3. Case of Mrs. M. C. before operation. Artificial pneumothorax with the fluid level of a purulent exudate.

monary compression throughout the pneumothorax treatment, the lung being most expanded just before each refill and most compressed after the introduction of the air. After full thoracoplastic collapse

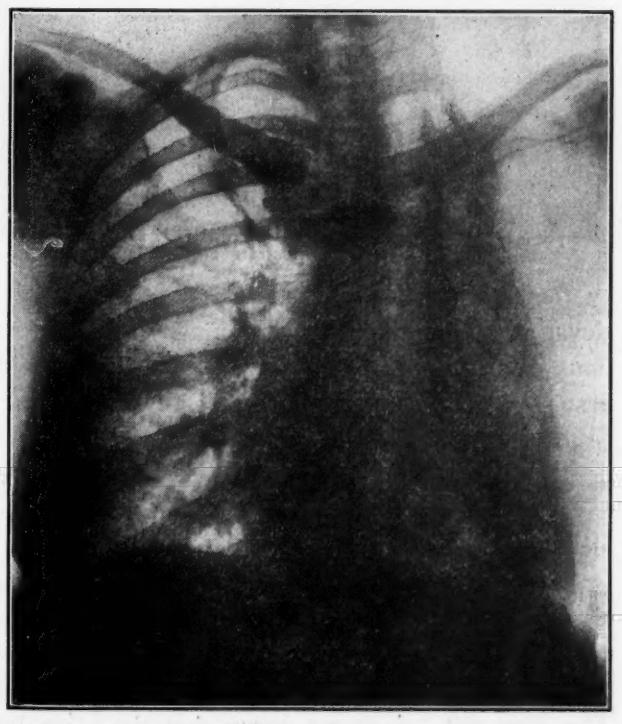

Fig. 4. Same case as Fig. 3 nearly two years after chest collapse. The empyema cavity is not yet entirely obliterated. Note shadow of iodoform and oil injected for demonstration.

with phrenic nerve resection, the ribs are splinted together by bridges of bone and respiratory motion is brought to a minimum, although the actual reduction in the size of the lung is not so great as it is in full pneumothorax. After all, however, *rest* is the principal curative agent in tuberculosis and in no way can this be brought about so completely as by

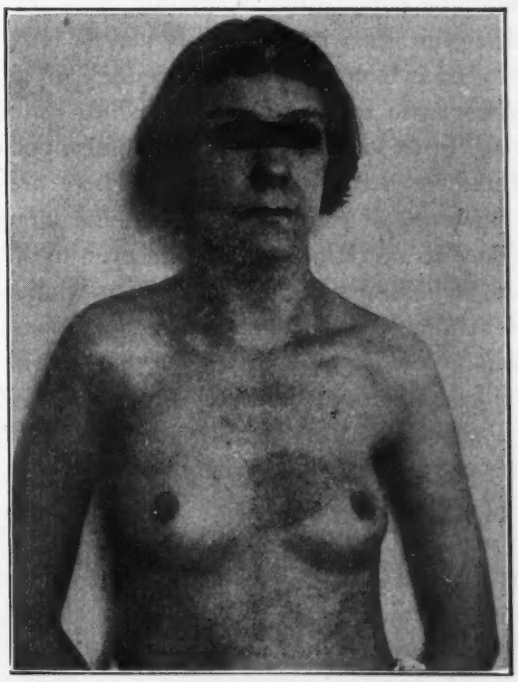

Fig. 5. Same case about a year after operation.

thoracoplasty with the addition of phrenic paralysis. Belonging to the second class there will be found cases in which enormous apical destruction has re-

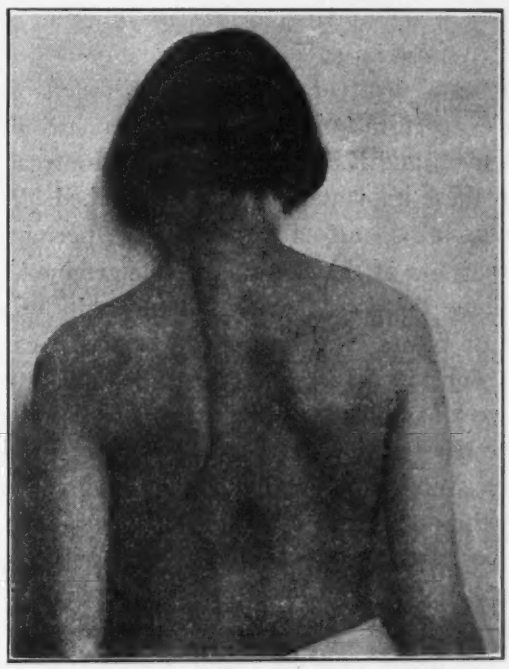

Fig. 6. Same case; posterior view. The original thoracic fistula is still present. Deformity slight. Compare with roentgenogram.

sulted in the formation of great cavities which can hardly be distinguished from pneumothorax. Indeed, a full history with repeated observation during the formation of the cavity may be essential in making the diagnosis. When such excavations are pres-

ent and yet the remainder of the lung is not affected beyond hope, therapeutic pneumothorax is not always advisable. The good part of the lung will probably be compressed by the air, with possibly a resulting fibrosis, while the cavity may be only slightly reduced in volume, owing to rigidity of its walls. Thoracoplastic operations calculated to reduce the capacity of an entire hemithorax are also not clearly indicated in these circumstances. There are methods, however, of compressing the cavity alone so as to reduce its secreting surface and even to obliterate the entire hollow with little or no encroachment upon the remainder of the lung. These operations are of various types but all come under the description of extrapleural compression, sometimes referred to as apicolysis, though this term describes only a portion of the procedure.

The operation consists of opening the bony thorax near its dome, either with or without the resection of a rib and separating the costal pleura from this part of the chest wall. With the fingers, pressure can be made upon the pulmonary apex, through this mobilized costal pleura and an extrapleural space gained, equal in size to the cavity in the lung. This space is aseptic, so that fat from the patient's buttocks or abdomen may be implanted and the soft thoracic wall sutured over all. This operation was first suggested and performed by Theodore Tuffier of Paris. When sufficient fat can not be furnished from the patient's own body, mobilized flaps of his muscle (pectorals) can be used (Leonard Freeman of Denver, and E. W. Archibald of Montreal). The fat in these implantations is not absorbed. Whether the muscle will atrophy from disuse permitting of re-expansion of the cavity is not determined.*

Failing these two expedients, certain wax mixtures or pastes may be used to plug the cavity; if these substances are later extruded, we may still remove ribs subperiosteally from the apical portion of the chest and pack the outer wound firmly with gauze. While not so effective as the direct pressure upon the outer wall of the costal pleura, the cavity will be very greatly reduced as a preliminary to thoracoplasty. The only real danger in this operation is that of perforating the pathological cavity with the finger and the result, perhaps, of implanting tuberculosis into the extrapleural spaces.

In cases of tuberculous pneumonitis with consolidation and cavitation, conditions may arise in which thoracoplasty appears to be the only feasible means for relief. For example, repeated and severe hemoptyses in a case of this kind may threaten life, and yet such a lung can not quickly be collapsed by gas because of the massive infiltration. With the opposite lung in fair condition it seems as if something should be done almost as an emergency measure to place the parts at rest and check the tendency to bleeding. When there is reasonably collapsible pulmonary tissue the first thing to do is to attempt the induction of a pneumothorax. If then it becomes clear that sufficient collapse can not thus be obtained a phrenic nerve resection in local anesthesia should be made. This operation is a minor procedure so far as its danger to life is concerned, and the relief is sometimes immediate and great, the hemoptyses ceasing and the temperature falling. Examination

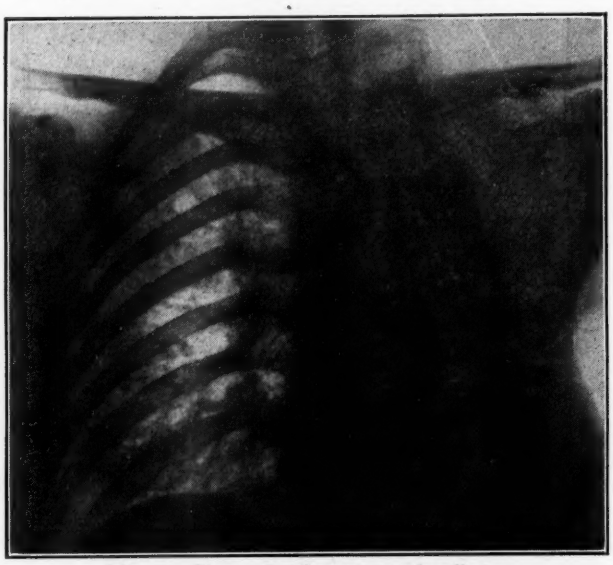

Fig. 7. Shown to illustrate good collapse.

by the *x*-ray following the resection will show an elevation of the diaphragmatic dome with slight motions of paradoxic respiration. In a few days the first step of collapsing thoracoplasty may be taken either in local anesthesia alone or combined with light nitrous oxid-oxygen analgesia. A week or ten days later the operation may be continued or completed.

As I have stated above, there are two main classes in which thoracoplasty is particularly applicable.* In both, however, there is the one important condition of the unilateral type of the disease. This does not, of course, mean that the other lung

*A patient with non-tuberculous apical disease in which this technique was used by me died a number of months later and at autopsy complete fibrosis of the implanted pectoral muscle was found.

*Even when fibrosis has progressed to the point of healing, thoracoplasty may be indicated. In one case the suggestion was made by Dr. J. Burns Amberson that the mediastinum and its contents drawn by cicatrization far out of their normal position with resulting circulatory embarrassment might be relieved by thoracoplasty, causing the mediastinum, and especially the heart, to return towards a more normal position.

must be absolutely free from tuberculosis, for such cases are extremely rare. It does imply, however, that the "good" lung must have sufficient respiratory area and functional capacity to sustain life indefinitely. In cases suitable for apicolysis, the rule about the soundness of the other lung may not be invariably applicable. For example, there is no reason why a bilateral apicolysis should not be performed upon a patient with a large cavity in each apex, provided the total healthy lung area is adequate.

The best judge is the physician who has been in charge of the patient for months or years. On the question of the ability of the remaining lung to sustain life his opinion should be authoritative. It will

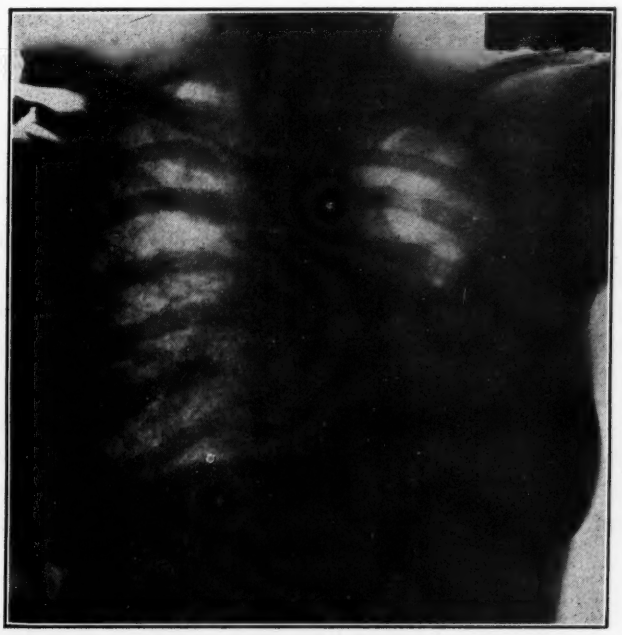

Fig. 8. Case of Mrs. T. D. showing enormous cavity in left upper lobe.

usually be found, however, that the physician in charge underestimates his tuberculous patient's power of resistance to surgical traumatism. As a matter of fact, these individuals are astonishingly resilient and quickly recover from shock. It must also be remembered that aside from a certain amount of unavoidable increase in tuberculous toxemia resulting from the compression of the diseased tissues there will be an immediate relief of symptoms, much the same as that resulting from a successful artificial pneumothorax.

I can not too forcibly emphasize the point that when an individual has made a convalescence, no matter how perfect or brilliant, from an operation for the relief of pulmonary tuberculosis, the disease is still present and the patient must continue to be treated on the well-known principle of rest and hygiene, better for a time in a sanatorium. The great improvement often noted directly after the operation and even before the wound is healed should not blind us to the fact that we have removed no part of the lesion. We have merely done something, impressive though it may appear, to put the patient in a position to receive the benefit of medicine, which would have been futile without surgery.

The principle on which depends the therapeutic effect of surgical operation in these cases of tuberculosis is that of producing great rigidity of the hemithorax and reduction in size of the chest cavity with the minimum amount of traumatism. The method preferred is that of multiple paravertebral **rib resection.** This reduces the volume of the chest to a degree much greater than would be thought possible considering the actual loss of osseous frame-

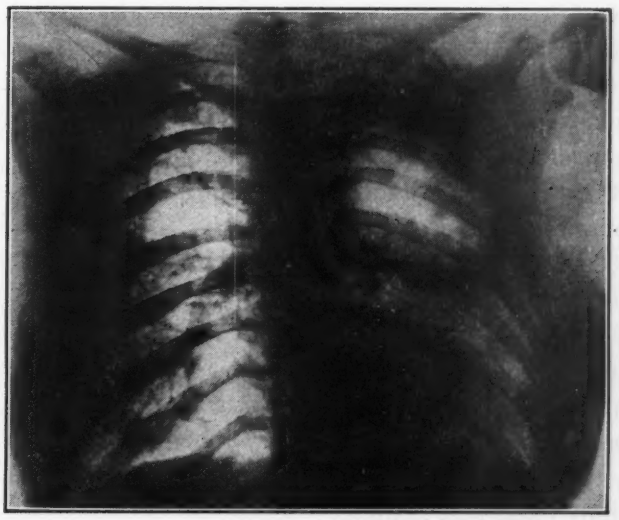

Fig. 9. Same case as Fig. 8 after extrapleural implantation of abdominal fat.

work, when the ribs are divided close to the vertebrae, even though little bone is removed. The ribs may be regarded as somewhat resembling the slats of a Venetian blind. All are bound together by muscular and tendinous structures and to some extent all are held in position by one another, so that, when all are divided, all will collapse toward the midline of the body. The cartilages permit great freedom of motion. The cartilage of the first rib is held to the clavicle by the subclavius muscle which elevates it by its contractions. When the ribs are divided behind their angles they are drawn downward into a slanting position by the intercostals and are still further displaced by gravity. When multiple resection is made, including the first rib, the entire side of the bony thorax and the shoulder slip downward and the ribs approach the vertical, thus collapsing the hemithorax. If the first rib is not divided it will do much to prevent this complete collapse by supporting to some extent the divided ribs

below. From the cases which I have chosen to report here it will be seen that this method of reducing the size of the thoracic cavity may vary in efficacy and may have to be later supplemented by other procedures, if surgery is to do its best, or to be temporarily discarded for some other method which will more directly attack a given point. In the presence of a large apical cavity, for example, Case 3, it may be more important at first to reduce or obliterate the cavity than to fix the lung. Or, in other instances, an apicolysis may be needed to obliterate a cavity which can not safely be compressed by thoracoplasty alone. When a lung has been long compressed by means of therapeutic pneumothorax it is far easier to reduce the size of the chest than when consolidated pulmonary tissue interferes with the operative caving in of the thorax. Indeed, in these infiltrated cases, the collapsing ribs may force the lung against the mediastinum, causing great and sudden deviation with displacement of the heart and encroachment upon the space of the opposite hemithorax. Then there will be dyspnea and cardiac embarrassment which, however, may be relieved by loosening the dressing so that the newly mobile ribs will permit the consolidated lung to regain in part its normal position, releasing the displaced mediastinum. But this is not meant to be a discussion of the entire subject—merely a little attempt to bring the surgical treatment of pulmonary tuberculosis before the casual reader and, I hope, create interest in a vitally important matter.

CONCLUSIONS.

1. Surgery is not intended to supplant medicine in the treatment of tuberculosis of the lungs. It should be resorted to when medical and hygienic treatment have nothing more to offer and the patient's life is intolerable or the prognosis is grave.

2. Operation may have two distinct objects. First, the placing at rest of an entire lung and, second, the obliteration of apical cavities.

3. Collapsing thoracoplasty, with phrenic nerve resection, puts the lung at rest to a greater degree than is possible by any other known method. It is only to be applied when the other lung can function sufficiently to support life, and when it is not affected by rapidly developing tuberculosis.

4. Thoracoplasty does not take the place of therapeutic pneumothorax for no return of function is possible. In pneumothorax lung function can be restored, when desirable, in a large number of cases.

5. Arrest or great improvement following collapsing thoracoplasty may be expected in about seventy-five per cent of the cases.

6. The obliteration of apical cavities can be done on both sides of the chest. It is worth performing the operation when the disease in the remaining parts of one or both lungs is capable of arrest.

7. The operations here discussed are sufficiently safe to be recommended in properly selected cases.

8. The surgeon must never lose sight of the fact that although his wound may heal and his immediate objective be reached, his patient still has tuberculosis and will long require medical and hygienic treatment.

[Case reports, omitted for lack of space, will be included in the author's reprints.]

THE "ACUTE ABDOMEN."

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"Acute abdomen" is an expression that depicts to the medical mind a suddenly developing serious condition, due to ill-defined trouble in that greatest of the body cavities, the abdominal.

The wise and successful handling of these conditions requires: a high degree of diagnostic ability; a broad conception of living pathology, as seen at the operating table; a wide knowledge of standardized surgical procedures; the exercise of great surgical judgment, both at operation and in the after-care.

The various conditions that may develop the "acute abdomen" readily separate themselves into three general classes: those due to congenital abnormalities; those caused by external violence; those that result from pathological conditions or the sudden extension of pathological processes.

To consider in detail the various types of cases in any one of these groups, would be far beyond the scope of a single paper. In order to get the most out of a short consideration of this subject, it would seem best to outline in a general way, some of the various conditions that most frequently develop in the "acute abdomen." Let us also formulate, in so far as possible, such general rules as will help us in surgical judgment, as to whether to operate, when to operate, and how to operate; emphasizing such special points as one's experience has seemed to prove especially valuable. To further fix these deductions on the film of memory, I shall cite such cases as illustrate the point at issue.

In the *congenital malformation group,* the "acute abdomen" may arise from any one of the following conditions:

diaphragmatic hernia;
retroperitoneal pouches with hernia and strangulation;
volvulus;

congenital inperforate anus;
Meckel's diverticulum.

The essential prerequisite to the understanding and handling of cases in the congenital malformation group is a working knowledge of embryology. When the younger or dorsal part of the diaphragm fails to unite with the ventral or older parts, diaphragmatic hernia develops through the aperture.

In May, 1910, Dr. K., of Yonkers, called me to a case of "acute abdomen." Mrs. L., 28 years, primipara, three months pregnant, had no recollection of ever being ill enough to remain in bed. Twenty-four hours before, while leaning forward to button her shoes, she had a sudden hiccough with nausea, followed by a faint feeling and later, soreness over the region of the appendix. That was the point of greatest sensitiveness. Temperature 101.6°, pulse 104, slight leucocytosis with 89% polynuclears, slight albuminuria. The symptom-complex was such that I did not feel the appendix was the cause, and advised an attitude of watchful expectancy. During the night she became markedly worse and was taken to the hospital. When I arrived several doctors who examined her were all of the opinion that she had acute appendicitis. Her abdomen was rigid; the appendicular region was especially sensitive; she was in profound collapse. Through a right rectus incision, exploration revealed an absence of abdominal viscera. The appendix and cecum could not be found. As I continued the preliminary exploration, I appreciated a large mass extending from the base of the mesenteric attachment toward the diaphragm, and following this up, it suddenly dawned upon me that I had to deal with a case of diaphragmatic rupture and hernia.

The stomach, spleen, the small intestines, and the greater part of transverse colon and cecum, were all in the chest. The stomach had to be emptied before it could be returned to the abdomen, and the spleen was so enlarged by distension with blood from strangulation that the diaphragmatic opening had to be further enlarged before it could be delivered from the chest. I had to use a portion of the cardiac end of the stomach to patch the hole in the diaphragm. The patient made a good recovery and continues well.

Had a more careful history been taken and properly interpreted, the condition could have been recognized before the abdomen was opened, for we subsequently learned from the patient's mother that as a girl she frequently complained that her "side bubbled". This emphasizes the great importance of the history of the case in every "acute abdomen."

Murphy was one of the greatest masters of diagnosis; his genius in his respect was unquestionably largely due to the fact that he always placed the history first in importance in making every surgical diagnosis. He early learned how to interpret a history so as to pick out the salient points. He placed the other helps to diagnosis in the following relationship: next to history the physical examination, then the *x*-ray and the laboratory findings. W. H. Mayo has frequently remarked that these two latter play a bad third and fourth. During the last decade, however, the *x*-ray has done more than any other one thing to advance diagnosis in abdominal lesions. Every community has its skilled operators, but how seldom do we find the great surgical diagnostician.

The following case will illustrate that other unusual condition—intestinal strangulation in retroperitoneal pouches,—which is so rare as often to escape consideration, by even the keenest diagnostician:

I was called to see Dr. B., of New Rochelle, who had been hiccoughing for about seventy-two hours. He gave a history of many such attacks, but never one so persistent. We decided on a course of treatment and I was to hear from him in the early morning, if he did not improve. In the forenoon his doctors telephoned to me that he had just vomited and that the vomitus was distinctly intestinal. We had him taken to the Mount Vernon Hospital. I found him in a state of collapse with rigid abdomen. On opening the abdomen I found in a perduodenal pouch a large loop of strangulated gangrenous bowel which required resection of about 18 inches of the intestines. He died several days later.

This was my first experience with such a condition and it had caught me napping, largely because the type of condition present was not considered and I had permitted the good doctor to belittle his distressing hiccough from which he had many times before suffered, without attaching any serious importance thereto.

I recall having had two other such cases since that time—one occurring after a hysterectomy, bowel stasis finally reaching the degree of obstruction. The patient would not consent to re-operation until the stomach content became stercoraceous. In that case I am sure the patient's life was saved by a very definite procedure, which I frequently employ in such conditions, viz., the introduction of a Rehfuss tube, which was left in the stomach that it might be washed almost continuously until reverse peristalsis had ceased (it was not removed for six days in this case). For a time the stomach was washed every fifteen minutes, the patient having no trouble to sleep during such procedure. In this case there was also strangulation in a retroperitoneal pouch with great distension of the afferent bowel.

No post-operative condition gives the surgeon greater concern than bowel stasis. When this develops to the degree of complete obstruction, one of the most common causative factors is volvulus, which is frequently due to congenital malformation of the mesentery or mesocolon of the sigmoid. Volvulus is

induced by sudden hyperperistalsis which coils the free bowel with its long attachment around a point fixed by agglutination. The most frequent point of its occurrence is in the sigmoid loop. More than most any other condition it calls for early operation. If the coil is long and much distended it is often very difficult to replace, even after the abdomen is opened. It is a good rule in these cases, especially if the bowel has been much over-stretched and distension ulcers have developed, to perform a jejunostomy, an ileostomy or cecostomy. This is an ideal procedure, as it not only empties the gut of its septic content and facilitates reposition, but permits easy subsequent flushings and the escape of intestinal gases. If the tissues are dehydrated or the toxins are overwhelming the patient, quantities of alkalies and carbohydrates in fluid form can be rapidly fed into the circulation by introduction through these tubes into the small intestine, where absorption readily takes place. Excision of the involved area will occasionally be necessary. Recall that the mesenteric root is only about six inches long and extends from the duodenojejunal angle across the spine into the iliac fossa. From this narrow root the mesentery spreads out fan-shaped a length of about 8 inches to its intestinal border, which is twenty feet long. How obvious then the benefit derived from the procedure of having the patient assume frequently the creeping position, on all fours, thus letting the intestines hang down from their dorsal attachment. This favors the readjustment of any displaced loops, frequently straightens out kinks and often actually cures volvulus. While on all fours, spatting the hand, placed on the abdominal walls, along the course of the colon with the other hand, often helps accomplish the result. If the volvulus is of the sigmoid, it may sometimes be uncoiled by placing the patient in the knee-chest position, then distending the rectum before dilating the anus, by carefully feeding in oxygen gas or, if this is not at hand, carefully distending with gas from a siphon of vichy. I seldom hesitate to employ these measures, even as early as twenty-four hours after the laparotomy (if occasion demands). It often does away with the use of cathartics and avoids the giving of many enemas. Senn prevented recurrence of volvulus by shortening the mesentery.

Acute diverticulitis must not be forgotten as a cause of the "acute abdomen." If it occurs in a Meckel's diverticulum, it belongs to the congenital group; if in an acquired diverticulum, it belongs to the great third class, viz., conditions that result from pathological processes, or the sudden extension of pathological processes within or into the abdominal cavity. In the intestinal obstruction group are a multitude of conditions that may suddenly develop the "acute abdomen." Some of the most important causes are: invagination or intussusception, which is the most frequent cause of the "acute abdomen" of infants; annular cancer; cicatricial obstruction from tuberculous ulcers; strangulation by obturation or compression in hernias, through gastro-enterostomy openings in the transverse mesocolon, under improperly fastened round ligaments or through windows in the broad ligaments; obstructions from foreign bodies, especially gall stones (enteroliths).

To consider for a few moments the last mentioned; if due to gall stones, it occurs in those cases where the common duct does not pass through the head of the pancreas (32 per cent) and can thus be tremendously distended. Bearing in mind the fact that the small intestine gradually narrows from above downwards, we the more readily appreciate that bowel stones usually become impacted in the lower ileum or at the ileo-cecal valve, which is the narrowest point in the gastro-intestinal tract. Obstruction early manifests itself by bombarding peristalsis which causes severe colic. As the bowel distends the pitch of the gurgle becomes higher, thus often differentiating it from other conditions. Vomiting usually appears late and the amount is excessive.

Miss C., age 74; had carried five heavy veranda chairs up three flights of stairs. She developed increasing abdominal distress and distension, which she attributed to "fresh pork chops." She said she had never been in bed a day in her life on account of illness. She had vomited half a chamber-pot-full of a substance which was unquestionably intestinal. I decided that delay would be fatal, so took her to the hospital and opened her abdomen. The gall bladder was entirely obliterated. The small intestines and stomach were greatly distended. The large intestine was collapsed; and two inches from the ileo-cecal valve was an impacted enterolith, the size of an English walnut. This was removed by longitudinal incision and, since it presented a saddle-shaped facet as smooth as a billiard ball, I realized that there must be another stone, and that they had recently left the bile tract. The other and smaller stone, found while flushing out the bowel, accurately articulated with the first. The bowel incision was closed in the opposite direction, so as not to narrow its lumen. Uneventful recovery. Subsequent retaking of the history revealed no previous morbidity, yet this woman had gone through all the stages of an obliterating cholecystitis with stones.

Let me emphasize that obstruction from enterolith in the bowel does not interfere with the local blood supply as does obstruction from large stones impacted in the cystic duct, where they are the chief

factor that causes the "acute abdomen" of necrosis of the gall-bladder by obstructing the return blood supply in the cystic veins. Because of the usual delay in calling the surgeon in cases of intestinal obstruction, this condition has a frightful mortality—the mortality not of surgery, but of delayed surgery.

With the Rehfuss tube, ileostomy, jejunostomy and cecostomy, we have in recent years saved a larger per cent. of these cases, even when distension has been so great as to cause complete paralysis, ecchymotic areas and distension ulcers.

To take up the *pathological perforation group*:

There are many pathological processes in the tissues and organs of the abdomen which, on reaching a point where they suddenly perforate into the general peritoneal cavity, give rise to the development of a sudden symptom-complex that places them in that group of cases prone to develop the "acute abdomen." Some of the conditions are:

acute appendicitis;
acute pancreatitis;
gangrenous or perforated gall-bladder;
necrosis or malignancy in tumors;
tumors with twisted pedicles;
hemorrhage into cystic or solid tumors;
perforating ulcers of the stomach, duodenum and colon;
ruptured pelvic or tubal abscesses;
perforation of the urinary bladder.

In acute appendicitis, or the perforation of any hollow viscus, the condition that makes the "acute abdomen", is an early generalizing peritonitis. In this condition the processes are: irritation; exudative reaction; fibrinous deposit; benevolent adhesions. The irritation, whether bacterial or simply chemical, if it cannot be stopped or removed by early operation, should be limited by complete bodily rest, restricting respiratory movements by a snug binder applied to the splinted abdomen. Gastro-intestinal rest in the early stage by an ample dose of morphine, is often wise treatment; but it must be carefully used in the latter stages when increased peristalsis is so necessary to carry off the septic bowel content, and unless an exploratory operation is decided upon, or the underlying pathological process is thoroughly understood, a second dose of morphine should seldom be given, as it invariably masks the symptoms.

The value of nearly all therapeutic measures is usually proportional to the closeness by which they simulate the natural processes of reaction and repair in the tissues of the organism; and measured by this standard, the nearer we can bring about physical rest of the invaded tissues, the better. The patient should therefore be put to bed. A snug abdominal binder should be early applied, especially in the septic cases, to help by curtailing abdominal respiration by this additional splinting of the abdomen, until operative work can be carried out. Early Fowler position during the stage of diffusion is helpful, as the peritoneum of the lower abdomen is much slower in absorption, thus facilitating the development of antibodies. If active hemorrhage is present and the operation cannot be performed at once, it is a good practice to reduce the local tension at the bleeding point and facilitate clotting, by bleeding the patient into his veins through the use of a tourniquet about the extremities, thus causing blood displacement. Don't spend too much time waiting for laboratory findings. While they are of great help in the chronic case, they are of little value in the acute and court fatal delay.

During the active stage of any acute abdominal inflammation, food should invariably be avoided. Give plain water, if any, but no fruit juices. Promote physiologic rest in the organs and tissues by the avoidance of all catharsis. Any purging is "damnable", especially if stomach and duodenal perforation have not been excluded; in these latter cases, remember not to give fluids by mouth. Don't poultice or apply turpentine; it often causes blisters which become infected and complicate operative procedures.

Acute Pancreatitis: As ruptured tubal pregnancy must always be considered in the case of lower abdominal pain in a woman in the child-bearing period, who has skipped one or more menses and suddenly begins to flow, so pancreatitis must always be borne in mind in a case of "acute abdomen," where the pain is high up and severe. If of the fulminating variety, the sudden expression of pain is due to perforation and the escape of pancreatic fluid in the region of the celiac plexus. The patient is usually of the obese type, and in about 40% of cases there is a previous history of stomach reflexes or gall-bladder disease. Collapse and profound shock occur early and continue. The onset is even more rapid than in duodenal perforation. Diaphragmatic paralysis early establishes a peculiar facial cyanosis and lividity. The diaphragm, next to the heart, is the most important muscle in sustaining life. The tenderness is usually in the midline and the left rectus is generally first to splint. Backache is common and severe, but is generally to the left of the spine. Pain is not relieved by vomiting, which does not increase in amount, as in low intestinal obstruction. The area of liver dulness is unchanged, "high in perforation". In intestinal obstruction peristalsis soon be-

comes bombarding—in perforation of pancreatitis, early intestinal stasis occurs, even the stethoscope eliciting no bowel sounds. In renal colic the patient is restless. In perforations the patient protects his tissues by a quiet, almost stimulating paralysis. If mild in type, tumor masses generally appear after seventy-two hours, due to fat necrosis, plastic exudate and fortifying adhesions.

When the abdomen is opened the first thing noticed is the odorless bullion-like fluid. Pathognomonic small yellowish-white areas of fat necrosis spot the mesenteries and omentum, the escaping enzymes splitting the fat into glycerine and free fatty acids which saponify with the calcium salts of the blood.

Early operation, multiple puncture and free drainage are the factors that lessen mortality. The easiest avenue of approach, whether through the gastro-hepatic or gastro-colic omentum, or the mesocolon, should be the elective route. If operation is delayed, occasional left lumbar puncture and drainage may be indicated. Post-operative stomach alkalinization, and glucose-proctoclysis to throw the work directly on the liver with suspension of gastro-intestinal digestion, are helpful procedures.

An early contribution to science by Flexner, showing that bile from the hepatic duct is irritating to the pancreas, has considerable bearing on the etiology of those cases associated with previous gall-bladder disease; for a stone impacted at the ampulla of Vater, with its usually contracted non-functioning gall-bladder, furnishes the modus operandi that carries the irritating bile of the hepatic ducts up the duct of Wirsung into the pancreas. In view, however, of more recent knowledge of the elective affinity of certain microorganisms for special tissues, undoubtedly a large percentage of cases results from hematogenous infection.

Gangrene and perforation of the gall-bladder are potent etiological factors in the acute abdomen. Gangrene is usually caused by the sudden wedging of the single mulberry type of gall stone in the lower part of the gall-bladder, or cystic duct. Hydrops of the gall-bladder ensues; intravesical pressure increases and frequently necrosis develops from the shutting off of the blood supply to the gall-bladder by pressure on and thrombosis of the cystic veins. This acute condition suddenly engrafted on a chronic one, that has for a long time been in need of surgical treatment, is frequently subjected to serious delay, because of a history of slight attacks with so-called medical cures. Early operation before perforation into the liver or abdominal cavity occurs is most essential to good recovery. Pain begins gradually; soreness and splinting steadily develop; chills and high temperature frequently occur. An ill-defined tumor mass progressively increases in the right upper quadrant, due to plastic exudate and protective adhesions. Great care is required in tying off the cystic stump because of tissue softening and future crippling adhesions should be prevented by fat implantation. Drainage should be avoided if possible.

In exploratory laparotomy of the "acute abdomen", the character of the peritoneal fluid observed as soon as the abdomen is opened, is a great help in the differential diagnosis, as to the point of perforation.

If fluid is odorless, with free gas, turbid, abundant, with food and lymph particles—usually stomach perforation.

If odorless, free gas, bile stained—duodenal or small intestine perforation.

If odorless, bile stained, no free gas—gall-bladder leakage.

Thin, dish-water-like fluid, with numerous white areas of saponified fat—always pancreatic perforation.

Creamy, non-odorous, purulent-ruptured abscess (usually pelvic.)

Foul abdominal fluid is most frequently caused by perforated appendix; but it may be due to perforation at any point in the large bowel, or to pelvic abscess.

If muscular rigidity has really subsided and is not simply modified by narcotics, or by progressive stupor of the patient, it generally may be taken as an indication for delay.

In the "acute abdomen," perhaps more than in all other conditions, the history of the case and the physical findings should direct the procedures.

Operate quickly, thoroughly, and gently. There is already pathological shock and every moment is precious.

In cases of suspected small perforations of the hollow viscera, it is good technic to fill the wound with saline solution just before opening the peritoneum, to demonstrate free gas in the abdominal cavity.

In these cases of "acute abdomen" more than all others, operative team work on the part of the nurses and assistants, is most essential. These cases frequently occur at night, or under conditions when the surgeon must accept such help as is most readily available. In all serious cases, the faulty practice of permitting the pupil nurse to be operative assistant, or instrument nurse, cannot be too emphatically condemned. Unfortunately, this is an all too

common practice in most hospitals, and frequently jeopardizes the life of the patient. It lengthens the time of operation, distracts the surgeon, often breaks and invariably slows up good technic. The ridiculous side of it all is, that not one nurse in a hundred will continue to do operating room work. If the axiom, "our first duty is the best interest of the patient", be more than mere words, the practice should be decidedly modified.

Death rate is occasionally influenced by operations that are untimely and unsuitable; but Deaver's remark that "so-called conservative treatment, watching for the symptoms to pass away, frequently results in the passing away of the patient," is equally true.

Timidity on the part of the surgeon in "the acute abdomen," is fatal. The moral courage to open the abdomen in the face of a possibly mistaken diagnosis, must be early acquired, if surgeons are to measure up to their responsibilities.

SPLENECTOMY FOR TRAUMATIC SUBCUTANEOUS RUPTURE OF THE SPLEEN. REPORT OF TWO CASES*

JOHN F. X. JONES, M.D.
PHILADELPHIA.

A force that crushes the left hypochondrium not infrequently causes rupture of the spleen. The stomach, left kidney, colon or ribs may sustain injury at the same time. Comparatively slight trauma may suffice to rupture a spleen enlarged by malaria or other pathological process. After the spleen has been ruptured there may be no shock and the signs of internal hemorrhage may be delayed for hours. Usually, however, immediate shock, prompt manifestations of internal hemorrhage, increasing dulness in the left flank, rigidity and tenderness in the left hypochondrium and limitation of abdominal breathing warn the surgeon that he must perform laporatomy forthwith.

CASE I. Michael N., white, age 9, admitted to St. Agnes' Hospital, September 24, 1923, at 5 P. M. A wheel of a milk wagon had passed over his chest and upper abdomen. Conscious but in shock. Temperature 97°; pulse 120; respirations 30. No visible evidence of injury to the skin of the thorax or abdomen. Abdomen soft. Treatment for shock immediately instituted. Six hours later, at 11 P. M., vomited. The upper part of the abdomen was rigid and tender. There was dulness in both flanks. Temperature 97.6°, pulse 110, respirations 26. Abdomen opened by median incision at 11.40 P. M., under ether anesthesia. Free blood in the peritoneal cavity—under the right lobe of the liver and about the spleen. Liver and gall-bladder intact. Spleen ruptured. Splenectomy. Time of operation, 30 minutes. During operation auto-infusion was performed, 450 c. cms. of the free intraperitoneal blood being restored to the patient's circulation through the median basilic vein. As there was some slight oozing of blood in the region of the pedicle, a gauze pack was left in the abdomen. With the aid of nitrous oxide anesthesia this pack was removed September 29, 1923. With the exception of a small stitch abscess, recovery was uncomplicated. Patient discharged from the hospital October 15, 1923. *X*-ray report: "Fracture of ninth rib of right side and of tenth rib of left side. Slight crack in the occipital bone—right side." Examination of blood, October 3, 1923, nine days after splenectomy: "Hb. 80%; leucocytes, 23,800; erythrocytes, 3,840,000; polymorphonuclears, 75%; small lymphocytes, 15%; large lymphocytes, 8o%; transitional leucocytes, 2%." Pathological report on excised spleen: "Specimen is a spleen 11½x4x4½ cms. Spleen shows three ruptures—one of them almost dividing it into two portions. On the costal surface, running down to the lower border, there is an ecchymotic area about 3 cms. in diameter. Spleen is very friable and on section several hemorrhagic areas may be seen. Histologically, there is a diffuse hemorrhage into the substance of the spleen, producing marked distortion and destruction of the pulp and of the follicles. No change in the type of cells which are more or less well preserved." (Fanz and Molina.)

CASE II. Alexander B., black, age 8, admitted to St. Agnes' Hospital, October 14, 1923, at 4 P. M. A wheel of a motor truck had passed over his chest and upper abdomen. Conscious but in shock. Temperature 96.6°; pulse 130; respirations 34. Abdomen negative to inspection. Tenderness in left upper quadrant. Tenderness over left costal margin. Abdomen soft. Treated for shock. At 7:30 P. M., three and one-half hours after admission, vomited. At this time there was rigidity of upper half of left rectus muscle. There was dulness in the left flank. Patient seemed to breathe with difficulty. Ether anesthesia. Abdominal section at 8 P. M., four hours after admission. Immediately before operation, temperature 100°; pulse 134; respirations 34. Abdomen opened by median incision. Peritoneal cavity filled with blood. Spleen lacerated. Splenectomy. Time of operation, 30 minutes. The patient's veins were of very small caliber and attempts at auto-infusion were unsuccessful. Patient died at the close of operation. Report of pathologist: "Spleen is 7x5½x3 cms. On one of the borders there is an ecchymotic area 2 cms. in diameter. This area of the spleen is very soft. On the inner surface of the spleen there is a longitudinal laceration running down the lower border. Microscopic section shows normal, healthy splenic tissue with some hemorrhage" (Molina).

As pointed out by R. H. Fowler (AMERICAN JOURNAL OF SURGERY, August, 1923, p. 194) twenty-three abdominal incisions for splenectomy—not including the transdiaphragmatic and thoracolaparatomy procedures—have been recommended. Let it suffice here to state that, because of uncertainty as

*Read before the St. Agnes' Hospital Clinical Society, November 16, 1923.

to whether or not the hemorrhage was limited to the left side, the incision in each of the reported cases was median (extending from the xyphoid process to a point below the umbilicus). Indeed, in the first case, it was suspected that the liver might have been injured. In each of these cases effective traction by Dr. Dorris rendered it possible to place clamps on the pedicle from the front—after the stomach had been pulled to the right and the gastro-splenic omentum divided.

The spleen, if normal, is entirely protected by the ribs. In its position in the left hypochondrium it is in close relationship with several important structures. The large convex surface of the spleen is in contact with the diaphragm. Its anterior or concave surface touches the cardiac end of the stomach, the tail of the pancreas, the splenic flexure of the colon and the mesocolon. Mesially, it is bounded by the left adrenal and by the left kidney. Except at its hilum the spleen is completely covered by peritoneum. The phrenico-splenic omentum or lienorenal ligament connects the spleen with the left kidney and the diaphragm. The splenic artery, a branch of the celiac axis, is located between the layers of this ligament. The gastro-splenic omentum connects the hilum of the spleen with the cardiac end of the stomach. On its way to the diaphragm, the phrenico-colic ligament, which suspends the colon at the splenic flexure, runs under and supports the spleen. The splenic vein unites with the superior mesenteric to form the portal vein.

The highest point of the spleen is placed by Quain, Treves, Morris and Cunningham, at the level of the ninth thoracic spine; by Piersol, at the level of the ninth thoracic vertebra. The lowest point of the normal spleen is at the level of the first lumbar spine, according to Treves, and Quain; it is at the level of the first or second lumbar vertebra, according to Piersol. The spleen is placed parallel to the ninth and tenth intercostal spaces by Langer-Toldt; parallel to the ninth, tenth and eleventh ribs by Corning, and Merkel. "A line drawn from the top of the sternum to the tip of the eleventh rib should lie anterior to the spleen" (Eycleshymer and Schoemaker—A Cross Section Anatomy, 1911). Sir Berkeley Moynihan (The Spleen and Some of its Diseases, 1921) says that the spleen lies obliquely beneath the ninth, tenth and eleventh ribs, in a quadrilateral space, the surface markings of which are two parallel lines from the spinous processes of the ninth dorsal and first lumbar vertebrae—joined by a perpendicular line erected 4 centimeters (1½ inches) to the left of the midline of the body and by the left mid-axillary line. Gwilym G. Davis (Applied Anatomy, 1910) holds that the upper part of the spleen rises as high as the tenth dorsal vertebra or ninth spine; that the lung posteriorly descends at least one vertebra lower and the pleura still another lower; that it follows that a penetrating wound entering the ninth costal interspace in the line of the angle of the scapula would wound first the pleura, then the lung, then the diaphragm, then the spleen, and finally the stomach; that if it entered the tenth interspace it would open the pleural cavity but probably escape the edge of the lung. When normal in size and location the spleen cannot be palpated. On percussion, we find that normal splenic dulness is limited to an area bounded above by the ninth rib, below by the eleventh rib, anteriorly by a line passing through the sternoclavicular joint and the anterior extremity of the tenth rib, posteriorly by kidney dulness in which it is lost.

Regarding the function of the spleen, I have no wish to rush in where physiologists fear to tread, but merely desire to quote a few of the findings of some of the investigators who have made scientific observations on splenectomized animals. Pearce, Krumbhaar and Frazier (The Spleen and Anemia, 1918) observed among many other important phenomena, that splenectomized dogs developed an anemia which lasted three or four or more months and which was followed by repair; that in these dogs hemolytic agents produced less hemoglobinuria and less jaundice than in the control dogs; that their red blood cells manifested an increased resistance to mechanical shaking, hyptonic salt solution, saponin, hemolytic serum and cobra venom. Having noted the effects of splenectomy on monkeys, Krumbhaar and Musser (*Arch. Int. Med.*, 1923, **31**) draw the following conclusions: the temporary anemia that follows removal of the spleen is due chiefly to lessened blood formation, the result of the loss, with the spleen, of a substance normally stimulating to the bone marrow; from the therapeutic viewpoint, the most important result of splenectomy is the persistent increased resistance of the erythrocytes; changes in the bone marrow, lymph nodes, and the stellate cells of the liver of splenectomized monkeys indicate that these tissues take over the spleen's share in disposing of waste erythrocytes and their disintegration products; etc.

According to Pearce, Krumbhaar and Frazier, Finkelstein has performed the largest number of splenectomies. During the years 1903 to 1913 he performed splenectomy sixty-six times with a mortality of 38%. One hundred and ninety-four cases of splenectomy for traumatic rupture of the spleen were collected by Vedova. The mortality was 33.5%. (Cited in John DaCosta's Modern Surgery, 8th edition, 1919.)

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WALTER M. BRICKNER, B.S., M.D., F.A.C.S., *Editor*
New York City

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SURGERY IN PLEURO-PULMONARY TUBERCULOSIS.

We have given much space in this issue to two contributions of more than passing interest.

The first of these, Dr. Lilienthal's article on surgical treatment in pulmonary tuberculosis, is presented because, while few of us have acquired much experience in this still specialized work, the article well indicates the developing applicability of surgical mechanics for the relief of cases of pulmonary tuberculosis that have not been stayed by medical treatment, and it fairly presents the various complications and types of cases that may today be selected as offering hope for betterment from the employment of these operative measures.

Splinting a diseased lung by collapsing it with gas introduced into the pleural cavity is now a familiar and accepted practice among phthisiotherapists; and one may, in this connection, take pride in recalling that while the induction of artificial pneumothorax was established in therapy by Forlanini it originated with an American surgeon—John B. Murphy.

THE "ACUTE ABDOMEN."

Dr. Walter Crump's interesting article in this issue of the JOURNAL contains some observations and advice that seem worthy of further comment.

Particularly valuable, it seems to us, is the method he employs (and here describes but very briefly) in dealing with distended and often paretic bowel, of stitching into one or more dilated loops a long, thin rubber tube, like the Rehfuss or the duodenal tube. Allowed to hang over the table, the tube or tubes drain much of its septic content from the gut while the operation is in progress; and after operation drainage continues through the tube, by which also fluids or medication may be introduced. The small tube may be stitched in in such a manner that the fistula will usually close soon after it is withdrawn. In peritonitis with intestinal paresis, the infecting focus having been dealt with, drainage of the paretic bowel is more important than drainage of the peritoneal cavity.

Apparently also very useful is the author's employment, in cases of reverse peristalsis and repeated vomiting, of practically continuous gastric lavage through a Rehfuss tube left in situ as long as necessary. In this connection, we may add, in passing, that in all cases of intestinal obstruction or of diffuse peritonitis the stomach should be washed out just before administering narcosis, lest, otherwise, the anesthetized patient drown in his own vomitus.

In an earlier editorial (the JOURNAL, May, 1923) and otherwise,* we have expressed the opinion that the use of a suction apparatus in abdominal operations for acute conditions associated with large effusions of blood or pus is often life-saving. Suction is not only less traumatizing than sponging, but, also, and especially, it is more rapid and more thorough; and since the evacuation of the fluid proceeds while the reparative steps of the operation are being conducted, it obviates the waste of precious moments. When a very large amount of blood escapes into the abdominal cavity, from rupture of a solid viscus or of an ectopic gestation sac, it should be citrated and reinfused into the patient's circulation.

Crump emphasizes the importance in diagnosis of careful attention to the history, and his case reports illustrate the value of previous symptoms and complaints that are apt to be overlooked or ignored. They often point the way to the diagnosis, as do also the order of appearance and the relative severity of the various signs and symptoms. Thus, sudden, excruciating pain in the upper abdomen immediately followed by pronounced rigidity and rapid pulse, is more apt to be due to perforation of a gastric or duodenal ulcer than to acute cholecystitis, even

*Brickner, W. M.—The suction apparatus in surgical operations, AMERICAN JOURNAL OF SURGERY, May, 1917.

though pain and tenderness be most pronounced in the right upper quadrant. It must be said, however, that even with the most painstaking analysis of the history and consideration of the physical findings the lesion found at operation is often not the one that was expected. This, however, is not important. What is important is, not the exact diagnosis, but the indication—the recognition of the need for operation, by which to deal with whatever condition is found.

Crump well states that while a single dose of morphine may be needed at the outset to relieve pain and to quiet the patient, continued morphine administration while the plan of treatment is still undecided, is dangerous because it masks symptoms. He might have made the same comment concerning the use of the ice bag. (Turpentine stupes and poulticing he condemns for other reasons). We do not believe that the subsidence of an acute appendicitis or cholecystitis is ever hastened by the use of an ice bag. If "freezing out" an appendicitis is adopted in response to popular notions, it should be remembered that the layman learned it from the profession; he should unlearn it through the profession. In mild cases when it has been determined that operation is not necessary, the ice bag may give some measure of local comfort and does no harm; but its use before the question of operation has been decided is distinctly harmful, for it numbs the sensitiveness of the skin and masks important local signs.

Briefly but emphatically Crump also warns against spending too much time waiting for laboratory findings. Of great help in chronic cases, they are, he says, of little value in these acute cases and they court fatal delay. To submit a patient with acute abdominal symptoms to gastro-intestinal roentgenography is almost unthinkable—and yet it is done, sometimes. Much more common is the practice of essaying to hang a surgical indication upon a blood cell count, of delaying operation or consultation because there is no leucocytosis, of sitting by during the precious hours that spell the difference between life and death, waiting for the white cell count to rise! Sometimes, indeed, there are doubtful cases, in which before the clinical picture is developed a blood examination may be helpful in determining the indication. When, however, there are acute abdominal pain and rigidity, not produced by pneumonia, we have to deal with the so-called "acute abdomen" and surgical intervention is needed, no matter what the blood count! (It is worth remembering, too, that while in these cases the pulse rate is more important than the temperature, occasionally gangrenous appendicitis is present, even though both pulse rate and temperature are less than 100).

To be sure, in differentiating between pneumococcus peritonitis and purulent peritonitis of other origin, a very high leucocytosis is strongly in favor of the pneumococcus infection. But here the history is of equal importance; a peritonitis developing acutely, rather than rapidly, without an attack of pain and without previous history of abdominal disorder, and especially in a child, may well be a primary peritonitis. More decisive than either leucocytosis or history is aspiration of the abdomen and smear examination of the pus. It often happens that cases in which there is a strong presumption of pneumococcus infection prove on operation to be appendiceal in origin. Therefore, while if the diagnosis of pneumococcus peritonitis is reasonably definite, one may well elect to defer operation, if there is doubt it is far wiser not to do so. It would appear that the mortality of pneumococcuc peritonitis is not materially, if any, greater among the cases submitted to primary operation than among those treated expectantly.

In a previous editorial (the JOURNAL, May, 1922) we discussed the occurrence in malaria of acute abdominal symptoms simulating appendicitis and cholelithiasis. Here, again the blood cell count may deceive, rather than help us for, as we have reported* and as Craig in his monograph on The Malarial Fevers also states, there may be, not a leucopenia, but a pronounced leucocytosis.

In these acute conditions, then, clinical judgment is far safer than all the diagnostic refinements; but abdominal diagnosis is notoriously difficult and, as Crump says, one must have "the moral courage to open an abdomen in the face of a possibly mistaken diagnosis". Confronted with an "acute abdomen" it is better to err, as one sometimes must, on the safe side—to be occasionally wrong, rather than right too late!

Progress in Surgery

Selections from Recent Literature

Subperiosteal Resection of Long Bones in Osteomyelitis. An Analysis of this Method of Treatment with a Report of Five Cases. HOWARD L. BEYE, Iowa City, Iowa. *Surgery, Gynecology and Obstetrics*, December, 1923.

Beye reports cases showing the end-results of subperiosteal resection of the tibia for extensive osteomyelitis and concludes:

It is fundamentally unsound to do a subperiosteal resection of the shaft of a long bone for osteomyelitis. In performing such an operation bone may be sacrificed which, if properly drained, would not only be

*Brickner, W. M.—The simulation by malaria of acute surgical abdominal disease, especially appendicitis. *Archives of Diagnosis*, April, 1913.

viable but play an important part in the restitution of the diseased shaft. Regeneration of bone from the periosteum remaining after subperiosteal resection may be limited and stop far short of a functional end-result. Deformities are likely to follow such an operation with resultant functional disability. The radical removal of diseased bone by this procedure does not necessarily mean that infection has been eliminated.

The Surgical Treatment of Burns. WALTER ESTELL LEE, Philadelphia. *International Journal of Medicine and Surgery,* November, 1923.

As burns differ widely in degree, character of tissue destruction, bacterial content, and progress of healing, no one procedure as a local measure will prove equally valuable for all cases and all stages.

Dakin's solution, when it can be borne by the patient, chemically removes the necrotic tissue of burns in the same satisfactory manner as in wounds, but only a small proportion of patients will endure the pain caused by its application to such hypersensitive surfaces. In the majority of cases Lee has had to be content with natural tissue autolysis assisted by the mechanical cleansing of the daily immersion in a 4 per cent. sodium bicarbonate solution.

Until the condition of surgical sterility is obtained a single layer of wide mesh paraffin gauze and the exposure of the part to the air provides the necessary drainage and a dressing that will float off the wound with minimal trauma.

It is usually necessary to employ a chemical antiseptic to obtain and maintain surgical sterility of burned surfaces if exposed to the air. The chlorine group has been the most satisfactory in Lee's experience. They must be tested to avoid the application of irritating free chlorine or hydrochloric acid in using dichloramine-T. Very weak strengths should be used at first (one-fortieth of 1%); as the patient becomes accustomed to the antiseptic it may be gradually increased to 0.5%.

The covering of burned surfaces, when surgically sterile, with wax films often maintains their sterility and thus provides the best conditions for the growth of new skin. The rate of growth of new skin and of grafted skin is at the maximum upon surfaces which have reached the condition of sterility in the shortest interval of time.

Concerning the Advisability of Resection in Perforated Gastric and Duodenal Ulcers. (*Über die Berechtigung der Resektion beim perforierten Magen-und Duodenalgeschwür.*) H. RIESE, Berlin. *Archiv für Klinische Chirurgie,* Volume 127, 1923.

In the hands of such experienced operators as have reduced their operative mortality to as low as 6 or 7 per cent in cases of resection of the stomach for chronic ulcer of the stomach and duodenum, immediate radical resection for acutely perforated ulcer has met with success in those cases operated upon within twelve hours after rupture. Brütt and Prader lay stress upon the bacteriological and chemical examination of the peritoneal fluid in determining the possible resistence on the part of the patient. The author reviews the literature and presents the histories of eleven of his own cases (in which there were 3 deaths) of gastric resection for perforated ulcer. The end-results are better than in palliative operations, and Riese believes that immediate resection in favorable cases will be preached more and more. The operation of choice is the Billroth I, second, the Billroth II.

Examination of Stomach and Pancreatic Function after Extensive Gastric Resection. (*Untersuchungen über Magen- und Pankreasfunction nach ausgedehnter Magenresektion.*) GEORG STEIN and EGON FRIED, Vienna. *Wiener Klinische Wochenschrift,* November 1, 1923.

The work of Stein and Fried contributes facts of physiological importance. Extensive gastric resection leads in most cases to anacidity and hyposecretion of gastric juice. This condition is not suddenly, but gradually reached. The gastric ferments decrease in output more slowly than the acid. About two months after the operation, stability is attained that is changed very slowly. Within the first two months one obtains after test meal a less effective gastric juice than that which can be found in the fasting stomach; later this condition is reversed. A functional pancreatic hyposecretion does not exist after stomach resection, and on the contrary there is hypersecretion.

Examination with the duodenal tube is considered a useful and important adjunct to the previously employed methods to study the changes after stomach resection.

The Diagnosis of Perforated Duodenal and Gastric Ulcer. (*Zur Diagnose des perforierten Duodenal- und Magenulcus.*) F. OEHLECKER. *Archiv für Klinische Chirurgie,* Volume 127, 1923.

While the diagnosis of perforated ulcers of the stomach and duodenum is usually made on the basis of the classical symptoms of sudden onset, sense of internal rupture, severe pain, board like abdominal rigidity, and previous history of long standing stomach trouble, a rather high percentage of cases is seen without any previous history of illness and with physical signs difficult to distinguish from those of gall-stone colic, pancreatitis, and appendicitis with peritonitis. The author's differential sign is a sudden, spontaneous, single, attack of pain over the outer portion of the right or left shoulder, (usually the right) which is due to stimulation of the sensory fibers of the phrenic nerve by the sudden outpouring of blood or stomach contents into the subphrenic space. This pain is fairly constant, but may not be noticed by the patient until questioned, since the much greater severity of the abdominal pain distracts his attention from everything else. The shoulder pain, of varying severity, may occur immediately after rupture or after 2 or 3 hours. It differs from the shoulder pain usually attributed to other diseases by the acuteness of its onset, the absence of hyperalgesia or hyperesthesia in the region of the shoulder and localization to the shoulder itself rather than to the region of the shoulder blade.

Some Cases of Destruction in the Ischium of Doubtful Etiology. AXEL ODELBERG, Stockholm. *Acta Chirurgica Scandinavica,* Vol. LVI, Fasc. III, October, 1923.

The author gives an account of the disease and treatment of 4 operated cases of destructive alterations of the os ischii, in children. In spite of the pathological-histological finds not being identical, and after the exclusion of tumor, tuberculosis, lues, etc., the author attributes these cases to some form of non-specific chronic inflammation. The *x*-ray appearance suggests tuberculosis.

Spinal and Cranial Injuries of the Baby in Breech Deliveries. A Clinical and Pathological Study of Thirty-Eight Cases. RICHARD N. PIERSON, New York. *Surgery, Gynecology and Obstetrics,* December, 1923.

Birth injury and shock in breech deliveries cause greater fetal mortality and morbidity than asphyxia. Unnecessary haste in breech extractions, prompted by fear of fetal asphyxia, often causes obstetrical complications leading to birth injuries.

The diagnosis of death from asphyxia in breech deliveries is only justified when (a) there is strong clinical evidence of asphyxia, but none of injury, and (b) when complete autopsy shows characteristic signs of asphyxia, but none of injury.

The incidence of breech extraction may be diminished by (a) the practice of external version when possible; and (b) by stricter limitation of the indications for version and breech extraction.

The high mortality and morbidity of breech deliveries may also be reduced by: (a) a management of labor and delivery that will effect full dilatation of the soft parts; (b) accommodating, in delivery, the long axis of the child to the axes of the pelvis, thus avoiding dangerous angulations; and by accommodating the longest diameters of the body, shoulders, and head to the longest diameters of the pelvis, thus avoiding a dangerous degree of traction and suprapubic pressure.

Book Reviews

The Examination of Patients. By NELLIS B. FOSTER, M.D., Associate Physician to the New York Hospital; Associate Professor of Medicine at Cornell University College of Medicine. Octavo; 253 pages; illustrated. Philadelphia and London: W. B. SAUNDERS COMPANY, 1923.

Dr. Foster's text-book of physical diagnosis is an excellent introduction to the subject. Teachers of first and second year medical students will welcome it in their work. The presentation is essentially sound and interesting, and reflects the average medical examination of the day, but lacks that completeness which should be the ideal for senior students and internes.

Failure to mention Ellis' valuable work in the section on pleural disease is regrettable, but is offset by the excellent and adequate presentation of some of the special fields neglected in similar books.

There is ample discussion of electrocardiography, examination of the ear and of the eye and of the Shick test.

The absence of references to the literature is a shortcoming to be corrected in future editions. The illustrations are excellent and well chosen. The press work is of the usual high standard set by the publishers.

No practicing physician can read the book without profit and enjoyment.

Local Anesthesia Methods and Results in Abdominal Surgery. By PROF. DR. HANS FINSTERER, Surgeon-in-Chief, Vienna Hospital of the Brothers of Charity. Authorized English Version by JOSEPH P. F. BURKE, M.D., Sc.D., LL.D., Buffalo, N. Y., Attending Surgeon, Buffalo Hospital of the Sisters of Charity and Buffalo City Hospital. Octavo; 349 pages; 42 illustrations. New York: REBMAN COMPANY, 1923.

A review of this work from the German text appeared in the JOURNAL, December, 1923. This translation is written to make more readily familiar to English-speaking surgeons the methods of Prof. Finsterer, by which he has achieved so much success in abdominal surgery upon patients whose debilitated condition makes general anesthesia dangerous. For example, in gastric resection for carcinoma or ulcer associated with emaciation, it is a matter of experience that the operative mortality is very largely made from those pulmonary and other complications that can be reduced by the employment of local anesthesia; and Finsterer has shown how much can be done in this respect by the use of splanchnic anesthesia through the methods of Kappis and of Braun.

At this writing Finsterer is in this country demonstrating his methods in various hospitals. To those abdominal surgeons who have seen him work and to those who have not had this opportunity, this English translation will be welcome.

Introduction to Medical Biometry and Statistics. By RAYMOND PEARL, Professor of Biometry and Vital Statistics in the School of Hygiene and Public Health, and of Biology in the Medical School, The Johns Hopkins University. Octavo; 379 pages; illustrated. Philadelphia and London: W. B. SAUNDERS COMPANY, 1923.

An appreciation of the applications of biometry to medicine is lacking among physicians. The expansions of public health work are calling for a wider use of statistical methods, but there is a definite sphere of usefulness in the ordinary presentation of surgical studies.

Biometry is concerned with the quantitative aspects of vital phenomena, and hence it possesses a mathematical foundation. Clinical surgery cannot escape its statistical implications, though, unfortunately, surgeons are not sufficiently cognizant of the value of the statistical approach to secure exactness in their data. Dr. Pearl has provided an excellent introduction to the subject and his broad experience is reflected in a practical exposition of statistical theory. The discussion of the raw data of statistics, the nature of medical records and their tabulation, together with the graphic presentation of statistical data, are presented with a clarity and a briefness that is gratifying, particularly in view of their serviceability.

The discussion of rates and ratios, the concept of probable errors, and the measurement of variations and correlations call for definite concentration on the part of those unfamiliar with statistical technic. If, however, the material presented were studied and assimilated, it would tend to raise the standards of exactness in presentation of medical facts and surgical opinions, based upon accurate statistical methods. It is a type of book which should at least be on the reference shelves of all hospital libraries, for the use of the consulting staff, of the hospital statisticians, not to mention the internes, who require some guidance in the interpretation of their own surgical experience.

Biometry deals with the vital phenomena and should be at least understood by those who strive to present the facts of life, sickness, and death in a scientific and basic manner.

Gynecology. By WILLIAM P. GRAVES, A.B., M.D., F.A.C.S., Professor of Gynecology at Harvard Medical School; Surgeon-in-Chief to the Free Hospital for Women, Brookline; Consulting Physician to the Boston Lying-In Hospital. *Third Edition.* Large octavo; 936 pages; 637 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1923.

Graves' distinctive and handsome treatise, beautifully illustrated by his own many half-tone and pen drawings and by numerous photomicrographs, has been extensively revised for this third edition. The author states that more than two hundred changes have been made in the text and illustrations in order to make the work, what it appears, indeed, to be, up-to-date.

As before, it is divided into three major parts. Part 1 (about 160 pages) concerns Physiology and Relationship of Gynecology to the General Organism. Part 2, Gynecologic Diseases, (about 450 pages) is written in a manner to be of service for the undergraduates, without burdening them with the matter in part 1 and in Part 3, Operative Gynecology (about 280 pages), which well describes and beautifully illustrates the accepted gynecologic operations. Underlying physiologic principles and pathology are properly stressed throughout.

Physiotherapy Technic. A Manual of Applied Physics. By C. M. SAMPSON, M.D., Formerly of the Physiotherapy Service, Walter Reed U. S. Army General Hospital, Washington, D. C., etc. Octavo; 443 pages; 85 illustrations. St. Louis: C. V. MOSBY COMPANY, 1923.

This manual describes the application of the various measures used in physiotherapy—massage, hydrotherapy, the electric modalities, actino- and thermo-therapy, etc., with especial emphasis on technic and the care of apparatus. It is based largely upon, and frequently refers to, the author's experience, as chief of department or otherwise, in various army, veteran and Public Health Service hospitals. Concerning the possible accomplishments of physiotherapy the author is, to use his own expression, a "peptimist"—a sort of "go-getter" optimist. The book is practical, and is not too elaborate.

Rhus Dermatitis. (Poison Ivy.) Its Pathology and Chemotherapy. By JAMES B. MCNAIR. Octavo; 297 pages; illustrated. Chicago: THE UNIVERSITY OF CHICAGO PRESS, 1923.

This interesting monograph represents an intensive study of: *rhus toxicodendron, radicans* and *diversiloba,* their morphology and distribution; their poison from the standpoint of pharmacology, botany and chemistry; the pathology and differential diagnosis of rhus dermatitis; and it provides a tentative method of treatment based on the chemistry of the poison. The nature of the latter is suggested as a result of a series of chemical experiments. The local use of ferric chloride solution is the most important chemotherapeutic suggestion. There are an appendix of case reports and an extensive bibliography.